

VRA 20: What are the risks of causing a new outbreak of foot and mouth disease (FMD) by stalking and shooting deer?

1. SUMMARY OF OVERALL RISK

This risk assessment was compiled according to terms of reference provided by the Scottish Government regarding time of delivery, title of veterinary risk assessments (VRAs) and level of detail required. EPIC scientists created a generic framework suitable for the VRAs; collated and updated existing information on risks; filled gaps in the documents (including references where appropriate); and drafted new VRAs where necessary. These documents may require updating as new information becomes available or legislation develops, or if more in-depth assessment is necessary.

The purpose of this document is to qualitatively assess the risk of the specified activity in the face of an FMD outbreak in the UK. The assessment includes proposed actions to mitigate the risks associated with the specified activity, and which could form the basis of license conditions where necessary.

DEFINITIONS OF RISK LEVEL (OIE 2004, DEFRA 2011):

Negligible So rare that it does not merit consideration

Very low Very rare but cannot be excluded

Low Rare but could occur

Medium Occurs regularly

High Occurs very often

Very High: Events occur almost certainly

Overall risk: The risk of allowing the activity described is:

	PZ	SZ	RZ
With no mitigation measures	not permitted	medium	low/medium
With mitigation measures described	not permitted	medium	low

2. LEGISLATION, DEFINITIONS & ASSUMPTIONS

Statutory disease control requirements are applicable to livestock premises on suspicion and confirmation of FMD. When suspicion of disease cannot be ruled out, and diagnostic samples are taken, a Temporary Control Zone is put in place (TCZ) surrounding the suspect premises. On confirmation of disease, a national movement ban (NMB) is enforced by introducing a national Restricted Zone (RZ). A 3 km Protection Zone (PZ) and 10km Surveillance Zone (SZ) are implemented which place restrictions on movements and activities around infected premises to prevent spread of disease. Later in the outbreak, restrictions may be relaxed either through reducing the size of the RZ or through allowing some resumption of normal activities under licence within the RZ, SZ or PZ. In this VRA, RZ is used to refer to areas which are within the RZ, but do not also fall within the PZ or SZ.

Stalking and shooting deer is not allowed in the PZ apart from the following exceptions:

The occupier of any land, members of the occupier's household, persons employed by the occupier as beaters and any member of a shooting party of not more than 3 persons authorised by the occupier, may shoot game, other wildlife or deer found on that land. A person may cull deer under the authority of a licence granted by the Scottish Ministers (FMD (Scotland) Order 2006 Schedule 4, paragraph 15).

In the SZ and RZ stalking and shooting are allowed under the authority of a licence granted by the Scottish Ministers. As above, the occupier of any land, members of the occupier's household, persons employed by the occupier as beaters and any member of a shooting party of not more than 3 persons authorised by the occupier, may shoot deer found on that land (FMD (Scotland) Order 2006 Schedule 4, paragraph 27, and Schedule 6, paragraph 6). Deer carcasses cannot be

moved from a premises in the RZ except under the authority of a licence granted by an inspector (FMD (Scotland) Order 2006 Schedule 6, paragraph 4).

Deer stalking and shooting covers stalking of predominantly red deer and roe deer but could include other species. Red deer stalking predominantly takes place on open hillsides on estates in the Highlands and Islands and usually involves small groups lead by a professional stalker. All terrain vehicles (ATVs) or ponies are used to bring deer carcasses back. The seasons for red deer are 1st July to 20th October for stags and 21st October to 15th February for hinds. Roe deer stalking is more common in lowland areas and usually involves just one or two people stalking in woodland at dawn and dusk or occasionally using a high seat or shooting platform. The seasons for shooting roe deer are 1st April to 20th October for bucks and 21st October to 31st March for does. Hunting deer with dogs is not permitted, but dogs can be used to help find wounded animals.

In this VRA, the term 'agricultural land' or 'agricultural areas' refers to land that is being used or has been used for keeping livestock or other FMD-susceptible animals. It does not include arable land where no livestock have been present for an extended period of time.

Disinfectants must be approved for use by the Diseases of Animals (Approved Disinfectants) (Scotland) Order 2008 as amended and be used at the FMD Order dilution.

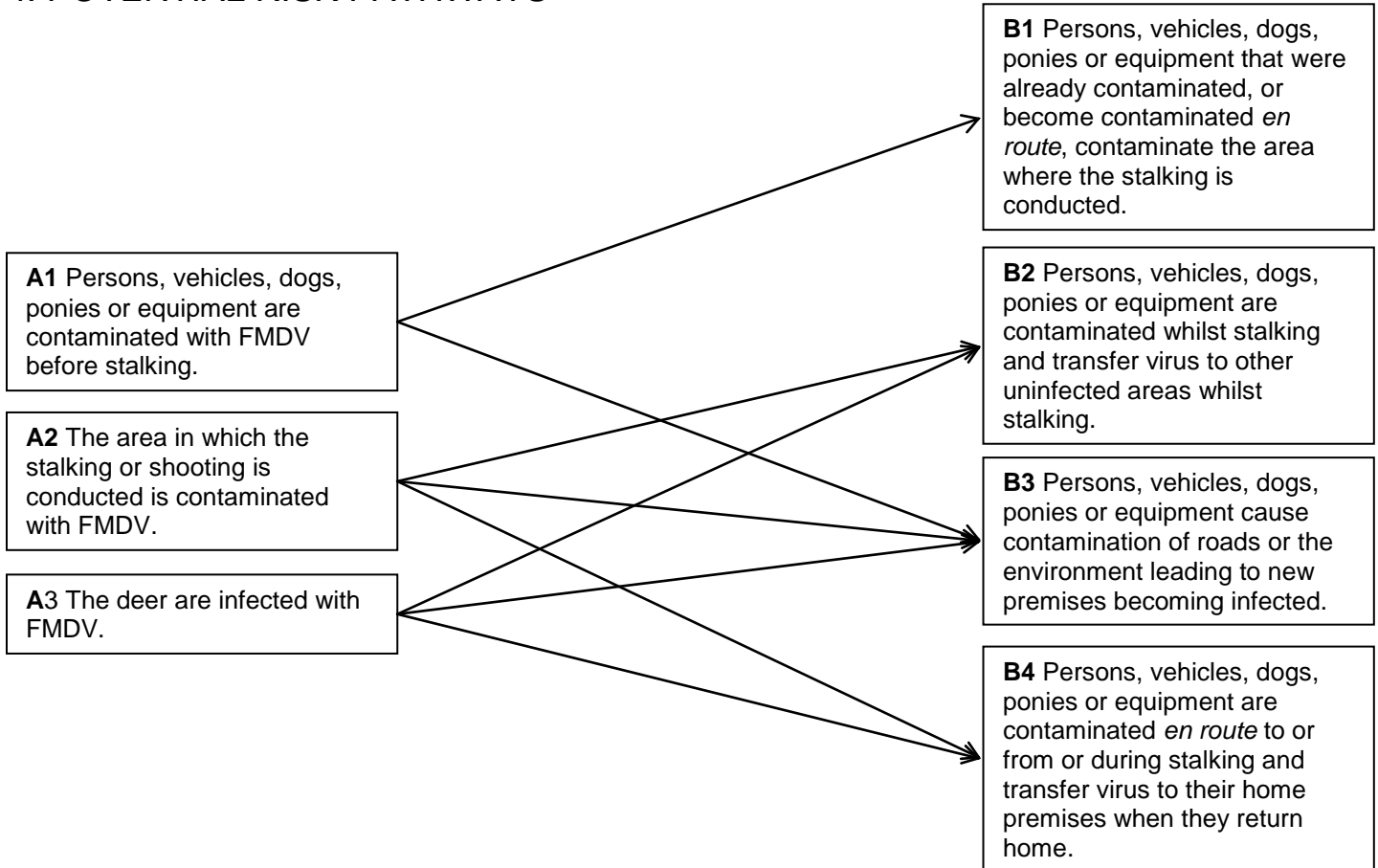
3. HAZARD IDENTIFICATION

(a) Hazard: FMD virus (FMDV)

(b) Specific risk:

During an FMD outbreak people stalking or shooting deer may come into contact with FMDV or with susceptible livestock. There is a risk that FMDV will spread via people or other fomites and cause further disease outbreaks.

4. POTENTIAL RISK PATHWAYS



5. EXPOSURE ASSESSMENT

Factors which are likely to affect this probability of exposure are:	Comments and risk estimates if/where appropriate
Infection source: A1 Persons, vehicles, dogs, ponies or equipment are contaminated with FMDV before stalking	
<p>In general, risk of contamination is influenced by:</p> <ul style="list-style-type: none"> Proximity to a premises where FMD has been detected (“infected premises”) 	<ul style="list-style-type: none"> Risk of transmission is highest adjacent or close to premises with FMD. Once a NMB is in place, most transmission occurs by local spread (<3km from premises with FMD) (Gibbens <i>et al.</i> 2001, Keeling <i>et al.</i> 2001, Haydon <i>et al.</i> 2003). It is difficult to quantify relative risks associated with different transmission routes within local spread but indirect transmission via fomites and contamination of roads and environment around premises with FMD are likely to play an important role. Risk of airborne transmission decreases rapidly with distance from premises with FMD and is only likely to occur over significant distances if many infected animals (especially pigs) are present (Donaldson and Alexanderson 2001). In a PZ there are known infected premises which may be at varying stage of diagnosis, slaughter, cleansing and disinfection. The risk of local transmission from detected infected premises is medium. In a SZ, there are no detected infected premises. The smallest distance at which infected premises could be located would be 3km away. The risk of local transmission from detected infected premises is low. In a RZ, there are no detected infected premises. The smallest distance at which infected premises could be located is 10km so the risk of local transmission from detected infected premises is negligible.
<ul style="list-style-type: none"> Presence of animals with undetected or incubating FMD, or failure to report FMD 	<ul style="list-style-type: none"> In addition to premises where FMD has been detected (“infected premises”), there may be premises where FMD is present but has not yet been detected. Infected livestock may excrete FMDV for several days before the appearance of clinical signs, potentially leading to transmission or contamination prior to disease detection, particularly in cattle and pigs (Alexanderson <i>et al.</i> 2003, Orsel <i>et al.</i> 2009). FMD in sheep can be difficult to detect clinically as not all animals show clinical signs, and clinical signs are usually mild and short lived (Hughes <i>et al.</i> 2002). In addition, sheep may be inspected less frequently/ thoroughly. There is therefore a higher risk of undetected infection on sheep-only premises. The risk of undetected infection is highest in a PZ, followed by a SZ then a RZ. The risk of undetected premises with FMD arising from spread over longer distances can be better quantified by analysis of movement data to identify movements of animals from areas where FMD has been detected, before the NMB.
<ul style="list-style-type: none"> Stage of outbreak 	<ul style="list-style-type: none"> Early in the outbreak there is increased risk of undetected infection in all zones and lack of information on movements.

<ul style="list-style-type: none"> Likelihood of detection and transmission is influenced by FMD virus strain 	<ul style="list-style-type: none"> There are 7 serotypes of FMDV: O, A, C, SAT1, SAT2, SAT3 and Asia 1. The different serotypes (and different strains within each serotype) have different characteristics for example in terms of host species susceptibility, length of incubation period, ease of detecting clinical signs and likelihood of air borne transmission (Kitching and Hughes 2002, Gloster <i>et al.</i> 2008). Much UK research is based on the 2001 outbreak, which was caused by serotype O, strain PanAsia. However future outbreaks may involve other serotypes/strains and therefore present different epidemiological situations. On confirmation of FMD, the serotype and strain would be identified by The Pirbright Institute. This information would help to inform estimates of risk.
<p>Specific risks: Likelihood that vehicles are contaminated (including estate vehicles which go into hills, ATVs, vehicles coming from elsewhere to the estate)</p>	
<ul style="list-style-type: none"> Origin of vehicles 	<ul style="list-style-type: none"> The risk that vehicles are contaminated is influenced by the proximity of the home premises to premises with FMD, and the presence of susceptible livestock with undetected infection at the home premises, as above. If vehicles are from the estate only and no susceptible livestock are present on the estate, the risk that vehicles move FMDV to the hills is very low. If vehicles are from the estate only, and the estate also keeps susceptible livestock, the risk of contaminated vehicles is increased.
<ul style="list-style-type: none"> Movement history of vehicles 	<ul style="list-style-type: none"> Movement to other premises with susceptible livestock increases probability of contamination.
<ul style="list-style-type: none"> Cleansing and disinfection of vehicles 	<ul style="list-style-type: none"> FMDV is very sensitive to approved disinfectants and good biosecurity will reduce risk of virus transfer via fomites such as personnel, vehicles and equipment.
<ul style="list-style-type: none"> Length and duration of journey, number of stops and proximity of route to premises with FMD 	<ul style="list-style-type: none"> Longer journeys, multiple stops and proximity of the route to premises with FMD increase the risk of vehicles becoming contaminated <i>en route</i>.
<p>Likelihood that people are contaminated (including people from estate - stalkers, assistants and people from outwith estate – clients, visitors)</p>	
<ul style="list-style-type: none"> Recent contact with susceptible livestock 	<ul style="list-style-type: none"> Risk is greatest if people have had contact with infected animals, and next greatest if they have been to premises with FMD. The likelihood and amount of contamination varies with species, stage of infection, degree of contact and cleansing and disinfection.
<ul style="list-style-type: none"> Occupation 	<ul style="list-style-type: none"> Likelihood and amount of contamination increases with potential occupational exposure to FMD (i.e. farmer, vet).
<ul style="list-style-type: none"> Cleansing and disinfection prior to arrival 	<ul style="list-style-type: none"> Risk of contamination decreases if clean clothing worn and cleansing and disinfection of outerwear has been undertaken
<p>Likelihood that dogs are contaminated before the stalking (dogs cannot be infected with FMDV but may carry the virus mechanically, for example on their paws)</p>	
<ul style="list-style-type: none"> Dogs used or not 	<ul style="list-style-type: none"> Dogs may be used to help track wounded animals.
<ul style="list-style-type: none"> Dogs from same estate or brought in from elsewhere 	<ul style="list-style-type: none"> No risk of bringing FMDV from another premises if dogs are from same estate.
<p>If dogs are brought in from another premises:</p> <ul style="list-style-type: none"> Proximity to premises with FMD 	<ul style="list-style-type: none"> See above Risks are highest in the PZ, followed by the SZ then RZ.
<ul style="list-style-type: none"> Presence of livestock with undetected infection at home premises 	<ul style="list-style-type: none"> The risk that dogs are contaminated is greatest if infected animals are present. Risk can be reduced by inspecting susceptible livestock regularly for signs of

	FMD and preventing dogs coming into contact with livestock.
<ul style="list-style-type: none"> Location of home premises, kennel facilities and exercise areas 	<ul style="list-style-type: none"> Risk increases with increasing proximity to premises with FMD.
<ul style="list-style-type: none"> Movement history of visitors and kennel personnel 	<ul style="list-style-type: none"> Risk is greatest if persons have had contact with infected animals, and next greatest if they have been to premises with FMD. The risk can be reduced by limiting visitors and ensuring appropriate cleansing and disinfection.
<ul style="list-style-type: none"> Movement history of dogs prior to stalking 	<ul style="list-style-type: none"> Movement to other premises, particularly if there is a high risk of undetected infection, increases the probability of contamination.
<ul style="list-style-type: none"> Source of feed and bedding 	<ul style="list-style-type: none"> Feed and bedding from premises with undetected infection may be contaminated. FMDV has been recorded surviving for 3 months on hay (Bartley <i>et al.</i> 2002).
<ul style="list-style-type: none"> If coming from elsewhere, length and duration of journey, number of stops en route and proximity of route to infected areas 	<ul style="list-style-type: none"> Longer journeys, multiple stops and proximity to infected areas increases risk.
<ul style="list-style-type: none"> Cleansing and disinfection 	<ul style="list-style-type: none"> Equipment used for dogs which has been exposed to susceptible livestock or potential contamination can be cleansed and disinfected. Dogs should be free from excessive dirt.
<ul style="list-style-type: none"> In Highland areas, ponies may be used to extract carcasses 	<ul style="list-style-type: none"> Ponies cannot be infected with FMDV but may carry the virus mechanically, for example on their hooves. Risks that ponies are contaminated are similar to those for dogs, above.
Likelihood that equipment is contaminated	
<ul style="list-style-type: none"> Previous use in contaminated areas without cleansing and disinfection 	<ul style="list-style-type: none"> There is a risk of transmission through equipment that has been used in other areas and become contaminated.
Infection source: A2 The area in which the stalking or shooting is conducted is contaminated with FMDV	
<ul style="list-style-type: none"> Proximity to premises with FMD, extent and timing of movements of susceptible animals from or close to premises with FMD and stage of outbreak 	<ul style="list-style-type: none"> See A1.
<ul style="list-style-type: none"> Presence and density of susceptible livestock in the area that stalking or shooting is conducted. 	<ul style="list-style-type: none"> The risk that the environment is contaminated is greatest if susceptible livestock are present in the area where stalking or shooting is conducted. Since FMDV can survive in the environment, risk is also increased if the area has been used for grazing livestock within the last month (longer if cold weather). Shooting parties may have to pass through areas where sheep or cattle are grazed to access areas for stalking.
<ul style="list-style-type: none"> Level of use of meeting place and surrounding land 	<ul style="list-style-type: none"> The risk that the environment is contaminated increases with increasing level of use
<ul style="list-style-type: none"> Presence of deer infected with FMDV 	<ul style="list-style-type: none"> See below.
<ul style="list-style-type: none"> Other wildlife in locality 	<ul style="list-style-type: none"> In other parts of the world, wildlife can play an important role in FMD transmission (Ward <i>et al.</i> 2007). All British deer species are susceptible to infection and can transmit virus to domestic livestock experimentally (Gibbs <i>et al.</i> 1975). Wild boar are also susceptible (Elbers <i>et al.</i> 2003, Hartley 2010). However in Western Europe post-outbreak serosurveys and diagnostic testing of animals with suspicious clinical signs have never revealed positive animals (Elbers <i>et al.</i> 2003, Mouchantat <i>et al.</i> 2005) and there is no evidence that deer or boar have played a role in FMDV spread in UK. The density of wild boar in the UK at present is likely to be

	<p>too low for boar to be of importance in transmission (Hartley 2010).</p> <ul style="list-style-type: none"> • The risk of disease spread through infected deer or wild boar is therefore negligible, but this risk could change if ecological factors change, such as deer and boar densities or contact patterns. Ideally risks should be assessed using up-to-date information for a specific location. • Other species can be infected, such as hedgehogs, but are unlikely to be important in transmission. • Wildlife can also move FMDV mechanically if they become contaminated (for example scavengers such as seagulls, crows or foxes). • Overall, the risks of further spread of FMDV associated with wildlife are very low but any activity which causes disturbance to wildlife does increase this risk, especially close to premises with FMD.
<ul style="list-style-type: none"> • Meteorological conditions 	<ul style="list-style-type: none"> • Favourable conditions will increase the probability of survival and thus probability of contamination being present. • FMD can survive on pasture for a few days in hot weather, and up to 2 to 3 months in bovine faeces at 4°C. Survival duration increases with decreasing temperatures, increasing relative humidity and presence of organic material and varies with virus strain (reviewed by Bartley <i>et al.</i> 2002).
<p>Infection source: A3 The deer are infected with FMDV</p>	
<ul style="list-style-type: none"> • Likelihood that deer are infected 	<ul style="list-style-type: none"> • In experimental infections both roe and red deer could be infected by two hours of contact with infected cattle. Roe deer showed severe clinical signs but subclinical infection was seen in red deer (Gibbs <i>et al.</i> 1975). Both species were able to transmit FMDV to sheep and cattle. However testing of 107 diagnostic samples from deer with clinical signs consistent with FMD, and 474 serum samples during and after the 2001 outbreak in the UK did not reveal any positive animals. The same pattern was observed in Germany and the Netherlands (Elbers <i>et al.</i> 2003, Mouchantat <i>et al.</i> 2005). • The evidence suggests that the risk of infection in deer is very low.
<ul style="list-style-type: none"> • Proximity to premises with FMD, contact with infected livestock 	<ul style="list-style-type: none"> • See A1. • Reducing the likelihood of contact between deer and susceptible livestock or livestock grazing areas reduces the risk of transmission, but may be difficult to achieve.
<ul style="list-style-type: none"> • Density of deer 	<ul style="list-style-type: none"> • Higher density increases risk of contamination if infection is present.
<p>Risk of transmission: B1 Persons, vehicles, dogs, ponies or equipment that were already contaminated, or become contaminated <i>en route</i>, contaminate the area where the stalking is held</p>	
<ul style="list-style-type: none"> • Contact between vehicles and susceptible livestock 	<ul style="list-style-type: none"> • Movement of vehicles onto land where susceptible livestock are or will be present increases the risk of transmission if vehicles are contaminated. This can be reduced by ensuring cars are parked on hard standing in areas that susceptible livestock do not access. • Cleansing and disinfection of wheels and undercarriage can eliminate the risk if done properly. This requires facilities but may be appropriate depending on the level of risk and size of the event.
<ul style="list-style-type: none"> • Total numbers of attendees (including personnel, 	<ul style="list-style-type: none"> • Higher numbers increase the risk that some will be

clients, assistants, dogs and ponies)	contaminated.
<ul style="list-style-type: none"> Number of contaminated personnel, vehicles and animals 	<ul style="list-style-type: none"> Increasing numbers increases the total probable amount of FMDV that would be released, if present
<ul style="list-style-type: none"> Proximity of the area where stalking and shooting is conducted to susceptible livestock 	<ul style="list-style-type: none"> The greatest risks are associated with the presence of susceptible livestock in the area where the event is being held. Susceptible livestock on adjacent premises are also at increased risk. Since FMDV can survive in the environment, there are also risks for livestock which are later moved onto to an area where contamination has been introduced. If the activity is taking place in areas which are not agricultural land and are never used for grazing susceptible livestock or growing feed or bedding for susceptible livestock, the risks are negligible. Shooting parties may have to pass through areas where sheep or cattle are grazed to access areas for stalking.
<ul style="list-style-type: none"> Contact between people and susceptible livestock 	<ul style="list-style-type: none"> Any potential contact with susceptible livestock increases the risk of transmission.
<ul style="list-style-type: none"> Duration of shoot and distance covered 	<ul style="list-style-type: none"> Total probable amount of contamination released is increased with duration of meeting and distance covered.
<ul style="list-style-type: none"> Season 	<ul style="list-style-type: none"> Both livestock husbandry and stalking/shooting vary with season. If times of highest stalking and shooting activity coincide with presence of livestock, there is a higher risk that livestock may be exposed to FMDV.
<ul style="list-style-type: none"> Presence and density of deer infected with FMDV 	<ul style="list-style-type: none"> As above
<ul style="list-style-type: none"> Dispersal of deer by shoot 	<ul style="list-style-type: none"> Increasing numbers of participants and increased amount of shooting create significant risk of disturbing natural fauna.
<ul style="list-style-type: none"> Infected carcass in contact with susceptible livestock 	<ul style="list-style-type: none"> Increased risk of transmission to livestock if carcasses are brought back to estate where susceptible livestock are present.
<ul style="list-style-type: none"> Cleansing and disinfection before starting activity 	<ul style="list-style-type: none"> FMDV is very sensitive to approved disinfectants and good biosecurity will reduce risk of virus transfer via fomites such as personnel, vehicles and equipment. Disinfectant foot baths can be effective at reducing contamination, as long as foot wear are also cleaned and disinfectant is regularly replenished.
<i>Risk of transmission: B2 Persons, vehicles, dogs, ponies or equipment are contaminated whilst stalking and transfer virus to other uninfected areas whilst stalking</i>	
<ul style="list-style-type: none"> Contact with infected livestock or contaminated areas, number of people, size of group 	<ul style="list-style-type: none"> See B1.
<ul style="list-style-type: none"> Area covered, number of premises covered 	<ul style="list-style-type: none"> See B1 plus if the stalking takes place on land owned by more than one estate, there is an increased risk of transferring FMD between premises.
<i>Risk of transmission: B3 Persons, vehicles, dogs, ponies or equipment cause contamination of roads or the environment leading to new premises becoming infected</i>	
<ul style="list-style-type: none"> Failure to disinfect vehicle, personnel and equipment before outgoing and return journey 	<ul style="list-style-type: none"> Appropriate cleansing and disinfection reduce risk of contamination.
<ul style="list-style-type: none"> Length and duration of journey, number of stops en route and proximity of route to susceptible animals 	<ul style="list-style-type: none"> Longer journeys and multiple stops increase risk of contaminating roads or environment. Proximity to high densities of susceptible animals increases risk of disease outbreak if contamination does occur.
<ul style="list-style-type: none"> Removal of carcasses to another location 	<ul style="list-style-type: none"> There is a risk of contaminating roads or environment if carcasses are transported safely. Deer carcasses can only

	be moved under licence.
Risk of transmission: B4 Persons, vehicles, dogs, ponies or equipment are contaminated en route to or from or during stalking and transfer virus to their home premises when they return home	
<ul style="list-style-type: none"> • Presence of susceptible livestock at home premises 	<ul style="list-style-type: none"> • Direct or indirect contact with susceptible livestock provides opportunity for transmission, if contamination is present.
<ul style="list-style-type: none"> • Failure to disinfect vehicles, personnel and equipment before entering the home premise 	<ul style="list-style-type: none"> • Appropriate cleansing and disinfection reduce risk of contamination.
<ul style="list-style-type: none"> • Removal of deer carcasses to another location 	<ul style="list-style-type: none"> • Risk increases if potential contact between deer carcass and susceptible livestock. Deer carcasses can only be moved under licence.

6. CONSEQUENCE ASSESSMENT

Spread of FMD to uninfected premises and/or uninfected parts of the same premises.

7. RISK MANAGEMENT OPTIONS

The movement of people to, from and during stalking and shooting deer does carry a risk of indirect spread of FMD via fomites to uninfected farms. Indirect transmission of FMDV via fomites is an important source of infection, and any vehicles, people, equipment etc. which come into contact with FMDV, risk passing disease to any livestock they come into contact with. However there is little information on the real importance of countryside access in FMD spread, meaning it is difficult to quantify this risk accurately. The risks associated with access to the countryside during an FMD outbreak are predominantly influenced by the likelihood that people will already be contaminated or that they will come into contact with contaminated land or infected but undiagnosed livestock whilst in the countryside. The highest risks are therefore associated with people that have had contact with infected livestock, people that come into contact with livestock whilst stalking/shooting, or risks associated with infected deer. The risks are higher in the PZ and to a lesser extent to SZ, since there are likely to be undetected premises with FMD, and people and other fomites are more likely to have come into contact with infected livestock.

Theoretical risk management options include:

- (i) Prohibiting all stalking and shooting (with the exception of a party of up to 3 people as specified in the legislation.)
- (ii) Prohibiting stalking and shooting in areas where the risk of FMDV being present is greatest, but permitting it in other areas.
- (iii) Preventing participation by people who keep or handle susceptible livestock in the course of their work, particularly in a PZ or SZ, and so are most likely to have been exposed to and contaminated by FMDV.
- (iv) Requiring participants to meet conditions regarding cleansing and disinfection.

There is no veterinary justification for automatically preventing access to the countryside at a GB or Scottish level. Real risks remain, particularly close to premises with FMD, but the risk is very low at larger distances from premises with FMD, particularly once the early stage of an outbreak has passed and the risk of undetected infection has reduced.

The risk is:

	PZ	SZ	RZ
With no mitigation measures	not permitted	medium	low/medium
With mitigation measures below	not permitted	medium	low

These risk levels were assigned based on scientific literature available and expert opinion where appropriate by considering the risk pathways and the factors affecting each risk pathway, as listed in sections 4 and 5.

8. SUGGESTED RISK MITIGATION MEASURES

The risk levels given in section 7 assume that the follow risk mitigation measures are followed:

A. At origin premises of dogs and ponies, if they are brought from elsewhere

- (i) If susceptible livestock are present
 - ensure physical separation from horses/dogs and land used by horses/dogs
 - inspect susceptible livestock regularly for evidence of FMD.
- (ii) Ensure that feed and bedding are from FMD free sources.
- (iii) Vehicles used to carry horses or dogs should not have been used to transport susceptible livestock.
- (iv) Disinfect transport vehicle, equipment and personnel before leaving home and before re-entry. Pick out and disinfect horses' feet. Ensure dogs or horses' coats are clean and groom where necessary.
- (v) Horses and dogs should not be allowed to participate if they originate from or have visited a stables or exercise area in a PZ.
- (vi) Avoid visiting other premises *en route* as much as possible. If other premises are visited they should comply with the same standards as the Home Premises described above.

B. At premises where stalking/shooting is conducted

- (i) Participants should not have visited an infected premises or any premises within the PZ where susceptible livestock are kept within the past 7 days.
- (ii) Cleanse and disinfect all vehicles on arrival at premises. Cleanse and disinfect vehicles and footwear if moving from estate offices onto hills. Approved disinfectants must be used at the correct concentration.
- (iii) Ensure that susceptible domestic livestock are not present on land used for shooting, or any route used to reach the area, or choose routes and shooting sites which avoid livestock areas. If the land or route has been grazed by sheep or cattle, it should not be used for at least 28 days after the last animal was removed, and the land should be kept free of livestock for at least 28 days thereafter. This should be followed at all times in the SZ and the RZ.
- (iv) If susceptible livestock are present at the premises, prevent contact between livestock and vehicles and equipment used for stalking and shooting. Visiting personnel eg clients should have no contact with livestock. Farm personnel should wear clean clothing and cleanse and disinfect outerwear before stalking/shooting.
- (v) All participants (including clients, assistants etc.) should wear clean clothing and footwear when joining the shoot.
- (vi) All participants should disinfect footwear before starting on the stalking/shooting.
- (vii) Dogs should be kept under close control when not working. Do not walk with dogs, even on a lead, where there may be cattle (because cattle are curious and approach dogs, and it may then be impossible to avoid contact with them);
- (viii) All vehicles, personnel and equipment should be cleansed and disinfected at the end of the shoot. If there are susceptible livestock present at the estate premises, cleansing and disinfection should be done before returning to the premises.
- (ix) Ensure there is no contact between deer carcasses and susceptible livestock.
- (x) Deer carcasses can only be transported elsewhere under licence.

9. SOURCES OF EXPERT ADVICE

This VRA is based on the following VRAs:

VRA 2001 #26 (AHVLA) "What is the risk of causing a new outbreak of FMD by hunting?" Authors: R. Jones, Lisa Gallagher, Dr. Louise Kelly, Dr. Marion Wooldridge

VRA 2001 #12 (AHVLA) "What is the risk of causing new outbreaks of FMD by staging a specific equestrian event on agricultural land?" Authors Dr Wooldridge, L Gallagher, Dr Kelly, C Livesey, C Proudman, J Woods, P Kitching, KC Taylor, A Turnbull

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11. REFERENCES

- Alexanderson S, Zhang Z, Donaldson AI, Garland AJM (2003) The pathogenesis and diagnosis of foot-and-mouth disease. *Journal of Comparative Pathology* 129, 1-36.
- Bartley LM, Donnelly CA, Anderson RM (2002) Review of foot-and-mouth disease virus survival in animal excretions and on fomites. *Veterinary Record* 151, 22, pp667-669.
- Defra, (2011) Qualitative analysis of the risk of introduction of Equine Infectious Anaemia (EIA) into Great Britain from an EIA endemic area through temporary movement of UK origin horses (Roberts, H. & Paterson, A.) Veterinary Science Team, 17 Smith Square, London, SW1P 3JR, United Kingdom. Version 1.0, Released 20 June 2011, p.15.
- Donaldson AI, Alexanderson S (2001) Relative resistance of pigs to infection by natural aerosols of FMD virus. *Veterinary Record* 148, 19, pp600-602.
- Elbers ARW, Dekker A, Dekkers LJM (2003) Serosurveillance of wild deer and wild boar after the epidemic of foot-and-mouth disease in the Netherlands in 2001. *Veterinary Record* 153, 22, pp678-681.
- Gibbens JC, Sharpe CE, Wilesmith JW, Mansley LM, Michalopoulou E, Ryan JBM, Hudson M (2001) Descriptive epidemiology of the 2001 foot-and-mouth disease epidemic in Great Britain: the first five months. *Veterinary Record* 149, 24, pp729-743.
- Gibbs EPJ, Herniman KAJ, Lawman LJP, Sellers RF (1975) Foot-and-mouth disease in British deer – transmission of virus to cattle, sheep and deer. *Veterinary Record* 96, 26, pp558-563.
- Gloster J, Doel C, Gubbins S, Paton DJ (2008) Foot-and-mouth disease: Measurements of aerosol emission from pigs as a function of virus strain and initial dose, *Veterinary Journal* 177, 3, pp374-380.
- Hartley M (2010) Qualitative risk assessment of the role of the feral wild boar (*Sus scrofa*) in the likelihood of incursion and the impacts on effective disease control of selected exotic diseases in England, *European Journal of Wildlife Research* 56, pp401-410.
- Haydon DT, Chase-Topping ME, Shaw DJ, Matthews L, Friar JK, Wilesmith J, Woolhouse MEJ (2003) The construction and analysis of epidemic trees with reference to the 2001 UK foot-and-mouth outbreak. *Proceedings of the Royal Society of London Series B-Biological Sciences* 270, pp121-127
- Hughes GJ, Mioulet V, Kitching RP, Woolhouse MEJ, Alexanderson S, Donaldson AI (2002) Foot-and-mouth disease virus infection of sheep: implications for diagnosis and control, *Veterinary Record* 150, 23, pp724-727.
- Keeling MJ, Woolhouse MEJ, Shaw DJ, Matthews L, Chase-Topping M, Haydon D, Cornell SJ, Kappey J, Wilesmith J, Grenfell BT (2001) Dynamics of the 2001 UK foot and mouth epidemic: Stochastic dispersal in a heterogeneous landscape. *Science* 294, 5543, pp813-817.
- Kitching RP, Hughes GJ (2002) Clinical variation in foot and mouth disease: sheep and goats, *Revue Scientifique et Technique de l'Office International des Epizooties* 21, 3 pp505-512.
- Mouchantat S, Haas B, Lutz W, Pohlmeier K, Frolich K (2005) Absence of antibodies to foot-and-mouth disease virus in free-ranging roe deer from selected areas of Germany (2001-2002), *Journal of Wildlife Diseases* 41, 3, pp599-605.
- OIE (2004) Handbook on Import Risk Analysis for Animals and Animal Products: Introduction and qualitative risk analysis, Vol.I. OIE Publications, Paris.
- Orsel K, Bouma A, Dekker A, Stegeman JA, de Jong MCM (2009) Foot and mouth disease virus transmission during the incubation period of the disease in piglets, lambs, calves, and dairy cows, *Preventive Veterinary Medicine* 88, 2, pp58-163.
- Ward MP, Laffan SW, Highfield LD (2007) The potential role of wild and feral animals as reservoirs of foot and mouth disease, *Preventive Veterinary Medicine* 80, pp9-23.

12. NOTES

None